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Seasonal evolution of subglacial drainage pathways within a soft bedded anastomosing system

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We have studied the dynamic annual subglacial behavior associated with Skálafellsjökull, Iceland, a temperate glacier resting on a deformable sediment layer, using subglacial wireless probes to measure till water pressure and tilt, surface installations to measure glacier motion, and a camera to measure river discharge. We argue that the subglacial hydrology system changes throughout the year from a fast connected system in the spring and autumn (with balanced inputs and outputs), to a duel system in summer with fast channels and slow moving storage (with greater inputs than outputs). In winter there is an episodic fast system associated with high meltwater input accompanied by changes in till water pressure and ice velocity and releases of water from a heterogeneous storage sources to produce some of the largest annual discharges. We develop models to relate the observed summer and winter discharges to daily ice surface melt. We demonstrate that there is a subglacial anastomosing system, consisting of water sheets at the ice-bed interface, bedrock cavities, braided channels with associated back-water reservoir areas, which has the ability to rapidly change channel form depending on melt-water inputs, and easily access water stored within a series of linked subglacial reservoirs.